



A COMPARATIVE OUTCOME OF EPIDURAL BUTOPHANOL AND TRAMADOL FOR POST-OPERATIVE ANALGESICS IN LOWER LIMB SURGERY

Anaesthesiology

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ABSTRACT

BACKGROUND: Epidural analgesia is a safe technique for post-operative pain relief and equivalent to traditional analgesic methods. Epidural narcotics have been extensively used for post-operative analgesia. **MATERIAL AND METHODS:** Total of 100 patients of either sex, belonging to 20-60 yrs of age, ASA grade I and II admitted for orthopedic lower limb surgeries in the department of Anesthesiology, ANMMCH, Gaya, Bihar. were selected randomly for the study. Combined spinal-epidural was administered to all the patients. Postoperatively when patient complained of pain (Visual Analog Scale > 4), either butorphanol 1mg or tramadol 50mg diluted to 10ml was given epidurally and all the parameters were recorded. **CONCLUSION:** Epidural butorphanol (1mg) is a safe and efficacious drug for post-operative analgesia. Epidural butorphanol provides a rapid, excellent but shorter duration of analgesia when compared to epidural tramadol.

KEYWORDS

Epidural butorphanol; epidural tramadol.

INTRODUCTION

Acute postoperative pain is a complex physiologic reaction to tissue injury, visceral distension or disease. Its manifestation of autonomic, psychological and behavioral responses results in unpleasant, unwanted sensory and emotional experience. Despite advances in knowledge of patho-physiology of pain, pharmacology of analgesics and development of effective techniques for post-operative pain control, many patients continue to experience considerable discomfort.

Epidural analgesia is a safe technique for post-operative pain relief and equivalent to traditional analgesic methods. Epidural narcotics have been extensively used for post-operative analgesia. However, disadvantage with use of traditional drugs like morphine is that many side effects such as nausea, vomiting, pruritis, urinary retention, drug dependence and delayed respiratory depression have been reported. They can not be used in elderly patients. With discovery of newer opioids like butorphanol, tramadol and fentanyl, a new era in pain relief has commenced. Butorphanol, a synthetic morphian derivative is a mixed agonist and antagonist non-narcotic opioid analgesic where as tramadol is a synthetic 4-phenyl-piperidine analog of codeine with a dual mechanism of action. The advantage with these newer drugs is that their potency is comparable to that of morphine, produce lesser respiratory depression, easily available, larger margin of safety and lesser incidence of nausea, vomiting, urinary retention, pruritis compared to morphine. Hence it is feasible that the present study will be conducted to assess the safety and efficacy of post-operative analgesia with epidural butorphanol compared with epidural tramadol.

Aims And Objective

To assess and compare the safety and efficacy of postoperative analgesia with epidural butorphanol and epidural tramadol in patients undergoing orthopaedic lower limb surgeries. To compare the degree and duration of analgesia, cardio respiratory effects and side effects between epidural butorphanol and epidural tramadol.

Review Of Literature

Pain is one of the most important concern of mankind and one of the foremost factor that has influenced the course of history. No one can share the gravity and severity of others pain. Persistent pain is the most frequent cause of disability and it constitutes a major national world health economic problem. Epidural anaesthesia is a central neuraxial block technique with many applications. The history of epidural and spinal anaesthesia goes back to 17th century.

Opiate receptors were identified in CNS by Pert and Sunder in 1973. A

large population of these receptors were localized in the dorsal horn of the spinal cord. In 1806, Serturner isolated morphine from crude opium and it was frequently used for post-operative medication and post-operative analgesia. A study using epidural narcotics like hydromorphone and morphine for postoperative analgesia concluded that analgesia produced by epidural narcotics was greater than IV narcotics and was relatively free of side effects. Michael Cousins and Laurence Mortin reviewed the role of intrathecal and epidural opioids in both animals and humans. They concluded that epidural route seems preferable because of its ability to titrate dose requirements and ease of repeated doses or infusion techniques. than 1mg. In a randomized double blind study, morphine and butorphanol were compared and concluded that epidural butorphanol provides safe, effective postoperative analgesia, has a prompt onset and a limited duration of action. Butorphanol also produces sedation comparable to or more than that of morphine which is desired in the postoperative period. An evaluation of analgesic efficacy and safety of epidural butorphanol in comparison to epidural morphine in 40 adult patients undergoing elective upper abdominal surgeries was done in a double blind controlled design. Post operatively patients were divided in to two groups. Opioid receptors belong to the super family of G protein coupled receptors. Studies indicate both presynaptic (indirect) and postsynaptic (direct) facilitatory and inhibitory actions of opioids on synaptic transmission in many regions of the nervous system. Tramadol is a centrally acting analgesic structurally related to codeine and morphine. It is a 4-phenyl-piperidine analogue of codeine. Butorphanol is a synthetic, agonist-antagonist opioid analgesic. Butorphanol exerts its analgesic activity through its agonist action at κ receptors. Its analgesic potency is 4-8 times that of morphine, 30-40 times that of pethidine and 16-24 times that of pentazocine. Its analgesic efficacy is sufficient for treatment of severe pain such as renal colic. A parenteral dose of 2-3 mg butorphanol produces analgesia and respiratory depression, approximately equal to 10 mg of morphine. However, it has a ceiling effect at 30-60 mcg/kg in the degree of respiratory depression produced, which is reversible by naloxone. Butorphanol causes minimal to no change in the biliary tree pressure, and therefore used safely in biliary tract surgeries.

MATERIALS AND METHODS

This study was carried out in the department of Anesthesiology, at, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar. The Study duration Two Years.

Collection Of Data

The hospital statistics has shown that about 95 cases of various orthopedic lower limb surgeries were performed every year. The mean

weight of 66.27 kg with SD of 6.82 at allowable error ± 2 , the calculated sample size n is 46. total number of 50 patients in each group with inclusion and exclusion criteria were selected for study, during a period of 18 months (time bound study). Patients will be allocated randomly to each group by lottery method.

Inclusion Criteria:

Patients undergoing orthopaedic lower limb surgeries in the age group of 20- 60 years of both sexes will be included with ASA grade I and grade II.

Exclusion Criteria:

Patients with ASA grade III, IV and V, Those with known hypersensitivity to local anaesthetics, Patients, physically dependent on opioids. Patients with local infection / inflammation

Statistical Data:

At the end of study, all data is compiled and analyzed statistically using, Diagrammatic representation, Descriptive data presented as mean $\pm$ SD, Continuous data are analyzed by paired /unpaired 't' tests and, Chi-square test to assess the statistical difference between the two groups.

During preoperative visit patient's detailed history, general physical examination and systemic examination was carried out. Basic demographic characters like age, sex and weight were recorded. During the pre anaesthetic check up, linear visual analogue score LVAS was explained to all patients using a 10 centimeter scale.

patients were preloaded with 10 ml / kg infusion of Ringer Lactate solution. All patients were administered combined spinal epidural anaesthesia using 2 segment technique after recording baseline pulse, BP and respiratory rate. An 18G epidural catheter was introduced in L3-L4 space and subarachnoid block was given in L4-L5 space using 2.5 ml of 0.5% heavy bupivacaine. Level of sensory block and haemodynamic parameters were monitored intraoperatively. All surgeries were performed under spinal anaesthesia.

RESULTS

Study was carried out in the department of anesthesiology, at ANMMCH, Gaya, Duration period two years. Hundred adult patients in ASA grade I and II of either sex, aged between 20-60 years posted for various orthopedic lower limb surgeries were selected for the study. The study was undertaken to evaluate the efficacy and safety of epidural butorphanol 1mg diluted to 10 ml of normal saline in comparison with epidural tramadol 50mg diluted to 10 ml of normal saline given for post-operative pain relief.

The minimum age of the patient was 20 yrs and the maximum was 60 yrs. The mean age of the patient in group T was 44.8 ± 13.1 and in group-B 46.2 ± 11.9 . Age incidences between two groups were comparable.

Age Distribution

Age group (yrs)	Group-T (Tramadol) n=50	Group-B (Butorphanol) n=50
20-30	9	6
31-40	13	12
41-50	9	9
51-60	19	23
Total	50	50
Mean	44.8	46.2
SD ($\pm$)	13.1	11.9

Onset, Duration And Quality Of Analgesia (vrs)

Variable	Group-T (Mean $\pm$ SD)	Group-B (Mean $\pm$ SD)	Statistical test	Significance
Onset of Analgesia(in min)	13.28 $\pm$ 2.04	11.20 $\pm$ 1.02	Z=5.25	P<0.01
Duration of Analgesia(in min)	369.8 $\pm$ 25.6	215.2 $\pm$ 26.0	Z=29.94	P<0.01
Quality of Analgesia(VRS)	3.22 $\pm$ 0.54	3.62 $\pm$ 0.49	Z=1.74	P<0.01

In group-T, (34) 68% of patients had pain scores of 3 when compared to group-B 19 (38%) of patients had pain score of 3. 14(28%) of patients

in group-T had pain scores of 4 when compared to 31 (62%) of patients in group-B had pain score of 4.

Cardiovascular And Respiratory Effects

before giving tramadol, pulse rate ranged between 70-90/min(81.32 ± 4.7), systolic BP 106-130 mm of Hg (118.4 ± 6.5), diastolic BP 70- 90mm of Hg(80.44 ± 6.2) and respiratory between 13-17(14.7 ± 1.0) bpm. After giving tramadol, pulse rate ranged between 64-92/min (78.42 ± 5.9), systolic BP 102-130 mm of Hg (115.77 ± 5.9), diastolic BP 64-90 mm of Hg (78.21 ± 5.7) and respiratory between 12-18(14.20 ± 0.9) bpm. before giving butorphanol, pulse rate ranged between 66- 90/min (78.36 ± 6.4), systolic BP 106-130 mm of Hg (117.8 ± 7.1), diastolic BP 64-86 mm of Hg (77.2 ± 6.7) and respiratory between 14-17(15.0 ± 1.0) bpm. After giving butorphanol, pulse rate ranged between 64-92/min (75.98 ± 6.9), systolic BP 100-130, mm of Hg (115.1 ± 6.8), diastolic BP 62 -90 mm of Hg (75.1 ± 6.7) and respiratory between 12-18(14.9 ± 1.0) bpm. Where as in group-B, after half an hour of giving drug 35(70%), after 1 hr about 38(76%) and after 2 hrs 33(66%) of the patients were sleeping normally. 9(18%) of the patients after 1hr and 4(8%) of the patients after 2 hrs in group-B had sedation score of 1. Sedation score was higher and was maximum at 1 hr with group- B, which was statistically significant (Chi-square test $X^2 = 9.95, p < 0.01$),

Side Effects:

In group-T, 9(18%) of the patients had nausea, 5(10%) had vomiting and none of the patients had sedation; compared to which in group-B, 3(6%) of the patients had nausea, 1(2%) had vomiting and 8(16%) of the patients had sedation. None of the patients in either group had respiratory depression or any other side effects in this study. Urinary retention could not be commented as few of the patients had indwelling urinary catheter.

DISCUSSION

Acute post-operative pain is a complex physiologic reaction to tissue injury. Pain is unpleasant sensory emotional experience associated with actual or potential tissue damage. There are two components of pain; physiological and pathological. Post operative pain is due to direct trauma to the tissue caused by surgery but may be aggravated by associated reflex muscle spasm or visceral distension. Pain being a subjective experience, it is difficult to convey or assess the severity. In clinical practice two basic approaches in forms of subjective assessment by patients and objective assessment of parameters altered in presence of pain like cardiovascular changes and respiratory changes in response to pain are studied to judge the severity of pain. Management of post operative pain still poses lot of challenge to anaesthetists, in spite of advances in anaesthesia and analgesia. Presence of pain indicates presence of some disease or damage in the body. Cutting, tearing, stretching and burning of tissues during surgery produces intraoperative and post operative pain. Pain is maximum with orthopedic surgery. If this surgical pain is not treated adequately, it may lead to derangement in various body functions. So treating pain is necessary to reduce the post operative morbidity and mortality. Combined spinal-epidural (CSE) anaesthesia is commonly used in orthopedic surgery. It combines both the rapid onset of the spinal analgesia and the flexibility of the epidural catheter. Opioids are powerful, centrally acting agents which have peripheral effects also, so opioids have been administered for many years to allay anxiety and to reduce pain associated with surgery. Opioids exert this therapeutic effect by mimicking the action of endogenous opioid peptide at opioid receptors. Tramadol is a well known, time tested drug in the field of anaesthesia. It is a synthetic piperidine analog of codeine. Tramadol is $1/5-1/10^{\text{th}}$ as potent as morphine and analgesic doses of Tramadol may produce less respiratory depression because of its non-opioid receptor mediated actions. Butorphanol is a synthetic morphian derivative introduced into Indian market since 2002 is a mixed agonist and antagonist non-narcotic opioid analgesic. Onset of action of tramadol in a study conducted by Pinky and others who used 100mg of epidural tramadol is 12 ± 3.53 min which is comparable to our studies. Where as onset of analgesia was about 21 ± 3.5 with use of 50 mg tramadol in another study conducted by Baraka et al.

A study by Mok showed that onset of action with 4 mg butorphanol was 15 min and 6.9 ± 3.6 in another study by Catherine O in 1989 when, 2mg butorphanol was mixed with 0.25% bupivacaine. In a study by Palacios, they have shown that adequacy of analgesia were indistinguishable between epidural morphine and epidural butorphanol. In another study by Yaddanapudi and others²⁰, overall

pain relief with epidural morphine and epidural tramadol was similar in both the groups. Palacios et al¹⁷. found that no patients in their study group receiving epidural butorphanol developed clinically important change in haemodynamic parameters while study by Rathie Pinky et al. showed that, even tramadol does not have significant alterations in these parameters.

In our study, even though there is mild fall in pulse rate and diastolic BP with butorphanol group, the cardiovascular and respiratory parameters were stable in both groups. The fall may be due to adequate analgesia resulting in less sympathetic discharge and comfortable sleeping.

In our study majority of the side effects were nausea, vomiting and sedation. Mild sedation is desirable in the post-operative period, which is seen with the butorphanol group (16%). In tramadol group about 9(18%) patients had nausea, 5(10%) had vomiting, where as about 3(6%) had nausea, 1(2%) had vomiting in the butorphanol group.

CONCLUSION

epidural butorphanol (1mg) is a safe and efficacious drug for post-operative analgesia. Epidural butorphanol provides a rapid, excellent but shorter duration of analgesia when compared to epidural tramadol. Epidural butorphanol had lesser side effects like nausea and vomiting but has sedation in milder degree which is an additional advantage in the post-operative period.

REFERENCES

1. Cronin M, Redfern PA, Utting JE. Psychometry and postoperative complaints in surgical patients. *Br J Anaesth* 1973; 45: 879-86.
2. Donovan BD. Patient attitudes to postoperative pain relief. *Anaesth Intens Care* 1983; 11: 125-28.
3. Morgan M. The rational use of intrathecal and extradural opioids. *Br J Anaesth* 1989; 63:165-88.
4. Ameer B, Salter FJ. Drug therapy reviews: Evaluation of butorphanol tartrate. *Am J Hosp Pharm* 1979; 36: 1683
5. Vickers MD, O'Flaherty D, Szekeley SM, Read M, Yoshizumi J. Tramadol: Pain relief by an Opioid without depression of respiration. *Anaesthesia* 1992; 47: 291-96.
6. Bonica John J, Editor. The management of pain, 2nd Ed, Philadelphia: Lea and Febiger; 1990.
7. Benedetti Castantino. Opioids, Sedatives, Hypnotics, Atractions In: Bonica John J. McDonald John S. Principles and Practice of Obstetric Analgesia and Anesthesia. 2nd Ed. Philadelphia: Williams and Wilkins: 1995
8. Bonica JJ. History of pain concepts and pain therapy. *Semin anesthesiology* 1985;4:189- 208
9. Brill S, Gurman M, Fisher A. A history of administration of local analgesics and opioids. *Eur J Anaesth* 2003;20:682-689
10. Behar M, Magora F, Olshwang D, Davidson J.T. Epidural morphine in treatment of pain. *Lancet* 1979;1:527-529.
11. Bromage PR, Camporesi E, Chestnut D. Epidural narcotics for post-operative analgesia. *Anesth Analg* 1980; 59:473-480 Cousins Michael J, Mather Laurence E. Intrathecal and epidural administration of opioids. *Anesthesiology* 1984; 65:276-310.
12. Cousins Michael J, Mather Laurence E. Intrathecal and epidural administration of opioids. *Anesthesiology* 1984; 65:276-310.
13. Albert L Maduska and Mehrdokht Hajghassemi. A double blind comparison of butorphanol and meperidine in labour, maternal pain relief and affect on the newborn. *Canadian Anesthetist Society journal* 1978; 35:398-404.
14. Vandam Leroy D. Drug therapy: Butorphanol. *Eng J Med* 1980; 302:381-384.
15. Abboud TK, Moore M, Zhu J, Murakawa K, Minehart M, Longhitano M et al.
16. Rathie Pinky, Verma RS, Jatav TS, Kabra Ajay. Postoperative pain relief by epidural tramadol. *Indian J Anaesth* 1998; 42: 38-42.
17. Baraka A, Jabbour S, Ghabash M, Nader A, Khoury G and Sibai A. A Comparison of epidural tramadol and epidural morphine for postoperative analgesia. *Can J. Anaesth.* 1993 Apr; 40(4):308-13.